Montana Hospital Discharge Data System

Surveillance Report

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Trends In Hospitalization With An Obesity Code, Montana 2001-2010

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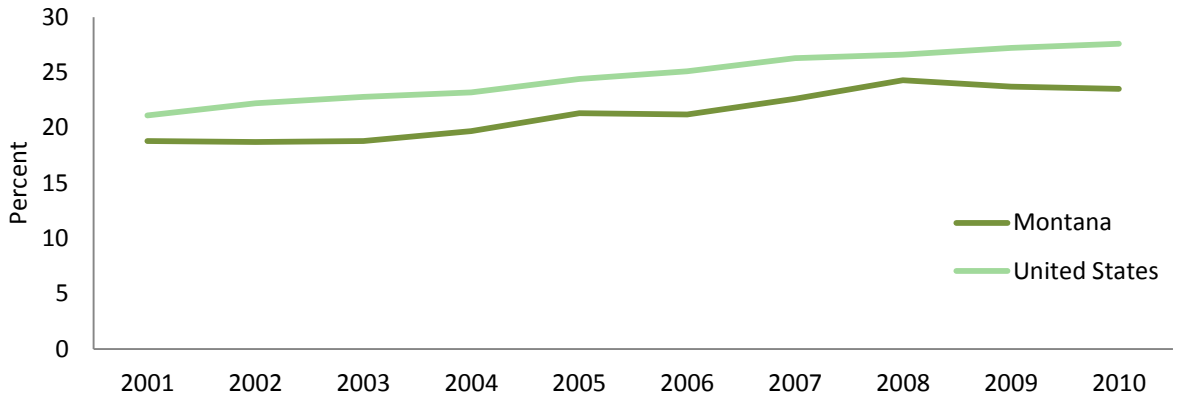
Obesity is a risk factor a number of conditions, including diabetes and heart disease. Obesity is often defined by body mass index (BMI), a measure adjusting weight for height.[1] Individuals with BMI values between 25 and 29.9 are considered overweight, and individuals with BMI of 30 or more are considered obese. The nationwide obesity prevalence among adults increased from 21% in 2001 to 28% in 2010.[2] Obesity prevalence in Montana also increased during this time period, although it remains lower than the national prevalence (Figure 1).

Figure 1. Obesity Prevalence, Montana and the United States, 2001-2010



Obesity (ICD-9-CM: 278.00 – 278.03) can be used as a primary diagnosis, but is more likely to be used as a secondary diagnosis.[3] The Montana Hospital Discharge Data System (MHDDS)[4] examined hospitalizations to Montana residents aged more than two years from 2001 to 2010 for obesity among secondary diagnosis fields. Only 2,205 hospitalizations (0.3%) had a primary diagnosis

[1] http://www.nhlbisupport.com/bmi/

[2] Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2001-2010.

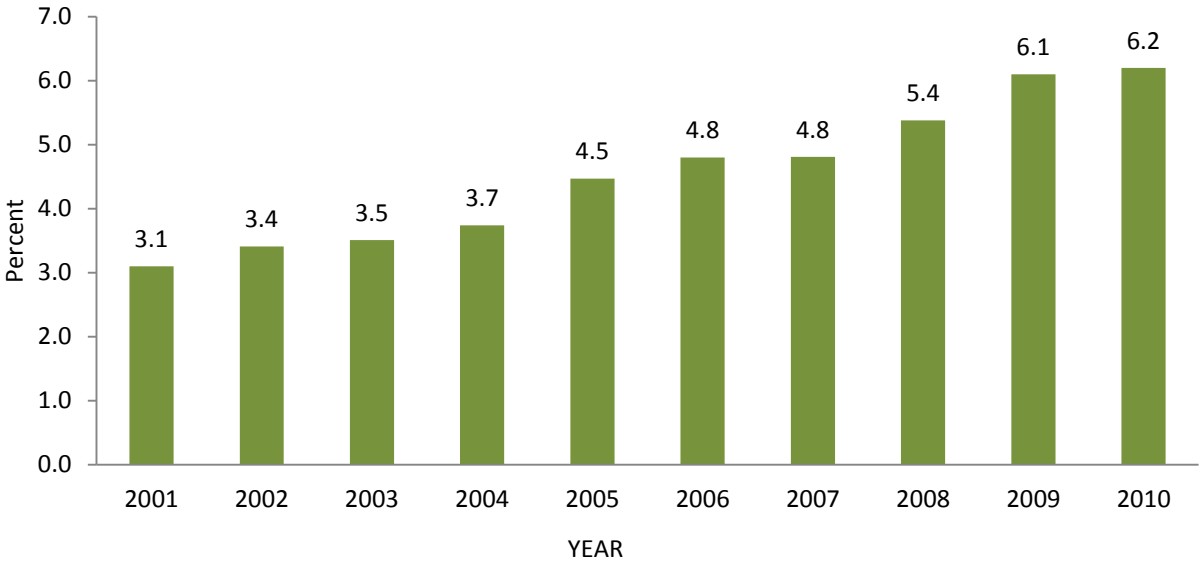
[3] http://www.icd9data.com/

[4] The Montana Hospital Discharge Data System (MHDDS) receives annual de-identified hospital discharge data set through a Memorandum of Agreement with the Montana Hospital Association and the Montana State Hospital at Warm Springs. Most hospitals in Montana participate in voluntary reporting of discharge data from their Uniform Billing Forms, version 2004 (UB-04). The MHDDS receives information on more than 95% of the inpatient admissions in the state. Information on charges was added to the MHDDS in 2008. Total charges are presented on a crude basis; no attempt to control for inflation or increases in health care costs are made.

of obesity; 40,126 (4.5%) hospitalizations had a secondary diagnosis of obesity. Obesity is generally indicated on the coding form when it is directly related to the primary diagnosis or procedures performed. It may not be coded if it does not relate to the primary diagnosis or procedures performed. Many obese patients were likely hospitalized for things not known to be directly related to obesity and we cannot identify these patients as obese.

In 2001, obesity was a secondary diagnosis on 3.1% of hospitalizations. By 2010, this percent doubled to 6.2% of hospitalizations (Figure 2). Likewise, obesity codes assigned indicate different levels of severity, including unspecified obesity (ICD=9-CM: 278.00), morbid obesity (278.01) and overweight (278.02). The proportion of obesity-related hospitalizations for which morbid obesity was coded increased from 30% to 42% from 2001 to 2010.

Figure 2. Percent Admissions With Obesity Coded, Montana Residents, 2001-2010



The prevalence of obesity codes did not vary by sex (Table 1). Obesity codes were most common among patients aged 45-64 years. Admissions for skin, subcutaneous tissue and breast disorders; the musculoskeletal system; female reproductive system and circulatory system had higher percentages of patients with indication of obesity than did admissions for other diagnostic categories (Table 2).

Table 1. Demographic Factors Related To Obesity Coding, 2001-2010		
Factor		Obese (%)
		N = 40,128
Age		
2-18		1.6%
19-44		4.1%
45-64		8.2%
65+		3.1%
Sex		
Male		4.1%
Female		4.8%

Table 2. Major Diagnostic Categories With Highest Percentage Of Patients With Obesity Codes, 2001-2010			
Major Diagnostic Category		N	Obese (%)
Skin, Subcutaneous Tissue, And Breast		1,559	7.9
Musculoskeletal System And Connective Tissue		8,626	7.2
Female Reproductive System		1,630	6.1
Circulatory System		7,992	6.1
Factors Influencing Health Status		975	6.0
Hepatobiliary System And Pancreas		1,539	5.8
Mental Diseases And Disorders		2,068	5.1

Previous studies have linked obesity to higher charges and length of stay.[5] During 2001-2010 in Montana, length of stay was identical, but mean total charges were higher for patients coded with an obesity code than for patients not so coded ($21,800 vs $18,200). Because of concern that obese patients might have different reasons for hospitalization, the MHDDS compared hospitalizations between obese and non-obese coded patients within major diagnostic categories. The largest differences among obese and non-obese coded patients were for hospitalizations for the musculoskeletal system and pregnancy (Table 3).

Table 3. Major Diagnostic Categories With Largest Increase In Mean Charges For Patients With Obesity Codes, 2008-2010				
Category		N (With Obesity)	N (Without Obesity)	Difference In Average Charge
Musculoskeletal System And Connective Tissue		3,598	33,056	$3,756
Pregnancy, Childbirth And Puerperium		1,020	35,166	$2,078
Circulatory System		2,396	31,145	$1,536
Kidney And Urinary Tract		409	8,703	$1,259
Female Reproductive System		723	6,607	$1,126
Skin, Subcutaneous Tissue And Breast		570	5,221	$1,088
Mental Diseases and Disorders		878	12,305	$1,005

[5] Woolford SJ, Gebremariam A, Clark SJ, Davis MM, 2007. *Obesity* 15(7):1895-1901; Vellinga A, O'Donovan D., De La Harpe D, 2008. *BMC Health Services Research*, **8**:88

To isolate the effect of obesity from diagnosis, separate linear regression models for charges and length of stay were developed incorporating: age in years, major diagnostic category, sex, and obesity (secondary code present or absent). Individuals with missing values for any variable were excluded from analysis. Even after controlling for age, major diagnostic category and sex, patients with an obesity code had charges $1,500 ($1,100; $1,900) higher per hospitalization than patients without an obesity code. Adjusted length of stay for patients with an obesity code was not significantly different than for patients without an obesity code, implying the difference in charges was driven by factors other than longer hospitalizations. Applying the estimated charge difference per patient to the number of patients with secondary diagnosis of obesity, there were a total of $7,800,000 in additional charges associated with obesity in 2010 alone.

Initially, it was hypothesized that obese patients have more comorbidities. However, patients without obesity codes had an average of 5.1 secondary diagnosis codes, whereas patients with obesity codes had an average of 5.4 (excluding the secondary diagnosis code for obesity *per se*). Diabetes was much more commonly indicated as a secondary diagnosis among hospitalizations with obesity codes than those without (31% vs 13%), but among patients with obesity codes, mean charges for those with diabetes also coded were only $500 higher than those without diabetes coded ($22,100 vs $21,600).

Obesity is a substantial contributing comorbidity; the proportion of hospitalizations with obesity listed as a contributing cause doubled during the past decade. Although obesity does not appear to pose a burden in terms of longer stay, the significantly higher charges do represent a substantial additional burden on the health care system.